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for example in the Compositae, the illustrations have apparently suffered somewhat in the process of reproduction; thus for instance in the genus *Crepis* the illustrations, as reproduced, add little or nothing to the text. In general, however, the illustrations are excellent, and one only regrets that they are not more numerous.

The presswork is exceptionally good; there are few typographical errors. On page 500, however, "Abizzia" occurs instead of Albizzia, which is evidently a misprint.

The value of this work as a textbook should not be overlooked. The discriminating text and complementary illustrations present the subject-matter in a satisfactory way for teaching purposes. The illustrations themselves are for the most part insufficient for the hasty determination of the species by the student, and they can be used to advantage only in connection with the brief but clear descriptions. In this regard the book has no equal.

On the whole this new edition of the well-known GRAY's *Manual* presents a flora of the central and northwestern United States, and adjacent Canada in a single volume of convenient size and moderate price, thoroughly revised to date, incorporating the verified results of recent years of research, and fully accords with the most advanced and universally accepted views of taxonomy.—J. M. GREENMAN.

Heredity

A recent volume on heredity, by PROFESSOR J. ARTHUR THOMSON² of the University of Aberdeen, "is intended," as the preface states, "as an introduction to the study of heredity." The writer has long been known as the joint author with GEDDES of the *Evolution of sex*, but is perhaps most widely recognized as the translator of WEISMANN'S works and the exponent of Weismannism. A review of such a book in a botanical journal needs no apology, for much of the more recent work in heredity has been done with plants, and moreover the book deals with those general fields of biological research which must always be of equal interest to botanists and zoologists. These fields will ever be the meeting-ground of botany and zoology, because in this class of problems the organism is treated as such, and the fact that it is a plant or an animal is of minor importance.

The work is divided into fourteen chapters, and among the topics dealt with may be mentioned the physical basis of inheritance; heredity and variation; reversion; telegony; transmission of acquired characters; statistical and experimental study of inheritance; theories of heredity and inheritance; heredity and sex; and a final chapter is devoted to the social aspects of biological results.

Heredity and inheritance are defined as follows (p. 13): "By 'heredity' we do not mean the general fact of observation that like tends to beget like, nor a power making for continuity or persistence of characters—to be opposed to the power of varying—nor anything but *the organic or genetic relation between succes-*

² THOMSON, J. ARTHUR, *Heredity*. pp. xvi + 605. figs. 49. New York: G. P. Putnam's Sons. London: John Murray. 1908.

sive generations; and by 'inheritance' we mean 'organic inheritance'—all that the organism is or has to start with in virtue of its hereditary relation to parents and ancestors."

In the chapter on the physical basis of inheritance the author discusses the phenomena and experiments connected with chromosome reduction and fertilization, and concludes from the evidence that the chromosomes are the bearers of hereditary characters, but that "we should be chary in committing ourselves unreservedly to the conclusion that the heritable organization is *exclusively* resident in the chromatin of the nuclei of the germ cells." The chapter on heredity and variation contains a clear exposition of the facts and theories of mutation and continuous variation. The author believes that both are important evolutionary factors; that mutation, so far as present evidence goes, may have been a much more important factor in plants than with animals; and that the distinction between "large fluctuations" and "small mutations" is merely a verbal one. Regarding the causes of variation he considers it "useful to say that variation is the expression of a qualitative asymmetry beginning in gametogenesis." "Variation is a novel cell division."

There is a lengthy treatment of the question of the transmission of acquired characters or "somatic modifications," with a critical analysis of the data usually cited as evidence. The result may be stated in the author's own words (p. 242): "The question resolves itself into a matter of fact. Have we any concrete evidence to warrant us believing that definite modifications are ever, as such or in any representative degree, transmitted? It appears to us that we have not. But to say dogmatically that such transmission is impossible is unscientific." The statistical studies of GALTON, PEARSON, and others are summarized, and under the experimental study of inheritance an array of data from the work of MENDEL, DeVRIES, BATESON, CORRENS, and many others of the recent school of genetics, which has begun to illuminate some of the obscure problems of hybridity, is brought together and discussed. These are largely the facts of Mendelism. In another part of the book blended, preponderant, and particulate inheritance are presented.

Other chapters are devoted to theories of heredity, which are largely theories of representative particles in some guise or other; and to theories of development, in which the author champions the determinants of WEISMANN and the latter's well-known theory of germinal selection. Under the topic heredity and sex, various theories of sex determination are discussed, including external and internal factors, and the author's theory is presented, namely that the difference in the sexes is merely a slight difference in "protoplasmic gearing" or in the "equation of metabolism." This view appears too vague to be of any value in directing the much-needed experiments on the subject. The author also apparently attaches too little significance to the discovery that in many insects an extra chromosome accompanies the female sex.

At the close of the work there is a representative bibliography of 48 pages, a very useful subject-index to the bibliography, and a general index to the volume.

The book is a broad and comprehensive treatment of the subject of heredity, a veritable mine of valuable data concisely presented and clearly discussed. The worker in these fields will find it almost indispensable for reference, and the more general reader will find it a very satisfactory and fascinating exposition of present-day views on these problems.—R. R. GATES.

Laboulbeniales

In 1896 the first part of a monograph of this group was published by THAXTER. The review in this journal³ gave a general account of its contents, which presented the history, literature, and morphology of the group, in addition to the description of genera and species known at that time. During the last decade material has accumulated rapidly, and several preliminary papers describing it have been published. There has now appeared a second part of the monograph,⁴ which brings together the material and illustrates it by a series of handsome plates. By means of visits to European collections and to South America, and through numerous correspondents, the new forms have multiplied remarkably. In the present part nearly 350 forms are illustrated, which increases the number described to about 500, included in more than 50 genera. In addition to these, more than 100 new species have been assembled since the completion of the present plates (in 1905), and these will be described and illustrated as soon as possible.

A brief review of the literature since 1895 is given, with comments on the morphology, development, etc., of the group, based upon the new data available. There is some modification in the conceptions of generic types, in the distinctions between series, etc.; but the comparative morphology of the group remains essentially as it was presented in 1895. This will be somewhat disappointing to those students of morphology who wish to relate Laboulbeniales positively to the Florideae; but the author wisely remarks that "it is foolish, on the basis of our present knowledge, to attempt an arbitrary settlement of the complex phenomena of series among the fungi." If he declines to be arbitrary about Laboulbeniales, no one else can afford to be so. Nevertheless, he thinks the statement safe that the group resembles the Florideae "in some respects more closely than they do any other plants, while at the same time they are more surely ascomycetes than many forms included in this group." He sees no reason why they should not be placed in the Pyrenomycetes, as a group coordinate with the Perisporiales, Hypocreales, etc.

This contribution, as the former one, is a model of painstaking and exact work, and of carefully weighed statement; and it is also an illustration of the wealth of material available for those who can see.—J. M. C.

³ BOT. GAZETTE 23:216. 1897.

⁴ THAXTER, ROLAND, Contribution toward a monograph of the Laboulbeniaceae. Part II. Mem. Amer. Acad. Sci. 13:219-469. pls. 28-61. 1908.